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*John*

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/305,019 05/04/99 ROTH

W 10151-1

023455 IM62/0720  
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EXAMINER

NGUYEN, T

ART UNIT

PAPER NUMBER

1764  
DATE MAILED:

7  
07/20/00

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

# Office Action Summary

Application No.  
**09/305,019**

Applicant(s)

**Roth et al.**

Examiner

**Tam Nguyen**

Group Art Unit

**1764**



☒ Responsive to communication(s) filed on May 31, 2000

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire three month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claims

☒ Claim(s) 4-10 is/are pending in the application.

Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 4-10 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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## **DETAILED ACTION**

### ***Response to Amendment***

The rejection of claim 10 under 35 USC § 112 is withdrawn by the examiner in view of the amendment filed on May, 31 2000.

### ***Claim Rejections - 35 U.S.C. § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 148 USPQ 459, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or unobviousness.

Claims 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0733608 ('608) in view of Cheng et al. (5,557,024).

The '608 reference discloses a transalkylation process of polyalkylbenzenes (e.g., polyethylbenzene) which is produced during the alkylation of benzene with olefins (e.g., ethylene) by using a crystalline aluminosilicate catalyst having an average size of less than about  $0.50\ \mu\text{m}$ . The alkylation and the transalkylation processes are conducted at a temperature between  $250^{\circ}\text{C}$  and  $500^{\circ}\text{C}$ , a pressure between 200 psi and 500 psi (1390 - 3447 kPa), at a WHSV from about 20 to  $150\ \text{hr}^{-1}$ , and a feeding ratio of benzene to ethylene from about 2:1 to 20:1. The reference discloses that the transalkylation process can be operated in a separate reactor, but it is preferred to recycle the polyalkylbenzenes to the transalkylation reactor. (See page 2 through page 3)

The '608 reference does not specifically disclose that the alkylation/transalkylation step is operated in the liquid phase, does not disclose that the alkylation catalyst is MCM-56 and the transalkylation catalyst is TEA-mordenite, <sup>and</sup> does not disclose operating the transalkylation in a separate reactor.

(4)

Cheng discloses alkylation and transalkylation processes in which a feed containing aromatic compound (e.g., benzene) and olefins (e.g., ethylene) is contacted with MCM-56 or beta

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zeolite catalyst in an alkylation zone to produce monoalkylbenzene products such as ethylbenzene. By-products (e.g., polyalkylbenzene), which are produced in the alkylation step, can be recycled to the alkylation reactor to undergo transalkylation or they can be reacted with additional aromatic feed in a separate reactor in the presence of TEA mordenite catalyst to produce monoalkylbenzene products. The reference discloses that the transalkylation zone is operated in a stoichiometric excess of aromatic compounds. Therefore, the ratio of benzene to polyalkylbenzene is greater than one. (See col. 3, lines 25-27; col. 6, line 2; col. 12, line 10 through col. 14, line 40)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the '608 process by utilizing MCM-56 as an alkylation catalyst and TEA mordenite as an transalkylation catalyst as suggested by Cheng because the '608 reference discloses that any crystalline aluminosilicate catalyst can be used in the process.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have to modified the '608 process by operating the process in the liquid phase because Cheng discloses that the alkylation and transalkylation processes can be conducted in either vapor phase or liquid phase. Therefore, it would be expected that the results would be the same or similar when operating the '608 process at the liquid conditions or vapor conditions.

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the '608 process by operating the transalkylation process in a separate reactor because Cheng discloses that the polyalkylated products can be recycled to the alkylation reactor to undergo transalkylation or they can be reacted with additional aromatic feed in a separate reactor. Therefore, it would be expected that the results would be similar or the same when operating the transalkylation step of the '608 process in a separate reactor.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 4 above, and further in view of Innes et al. (4,891,458).

All of the references above do not disclose the claimed transalkylation operating pressure and the weight ratio of benzene to polyalkylated benzene.

Innes discloses a transalkylation process of polyalkylbenzene and an aromatic compound (e.g., benzene) in which the transalkylation process is operated at a pressure of 50 psig to 100 psig (344 -6894 kPa) to maintain the process in the liquid phase. The reference also discloses that the molar ratio of aromatic hydrocarbon to polyalkylated aromatic hydrocarbon ranges from about 1:1 to about 50:1. This ratio appears to be within the range of the claimed weight ratio. (See col. 5, lines 43-54)

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the '608/Cheng process by operating the transalkylation process at the pressure and the molar ratio of aromatic hydrocarbon to polyalkylated aromatic hydrocarbon as taught by Innes because the Innes pressure will maintain the process in the liquid phase and the Innes ratio is effective for a transalkylation process of an aromatic hydrocarbon with an polyalkylated aromatic hydrocarbon.

#### *Response to Arguments*

The argument that the '608 reference is conducted in the vapor phase is noted. However, the argument is not persuasive because the examiner maintains that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the '608 process by operating the process in the liquid phase because Cheng discloses that the alkylation and transalkylation processes can be conducted in either vapor phase or liquid phase. Therefore, it would be expected that the results would be the same or similar when operating the '608 process at the liquid conditions or vapor conditions.

The argument that the '608 reference does not teach using a crystallized TEA-mordenite catalyst in a separate transalkylation reactor is noted. However, the argument is not persuasive because the reference discloses that the polyethylbenzenes can be directed to a separate transalkylation reactor or recycled to the alkylation reactor. Also, the reference discloses that **any**

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**aluminosilicate catalyst having a crystal size less than 0.50  $\mu\text{m}$**  can be used in the process.

The secondary reference, Cheng et al., discloses that an aluminosilicate catalyst such as TEA-mordenite can be used in a transalkylation process. Therefore, the examiner maintains that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the '608 process by utilizing a TEA mordenite as a transalkylation catalyst as suggested by Cheng. The examiner modified the '608 process by using TEA-mordenite as a **type** of aluminosilicate catalyst **having a crystal size less than 0.50  $\mu\text{m}$** . The examiner does not change the size of the '608 catalyst.

The argument that the '608/Cheng process would use a beta-zeolite catalyst in the transalkylation zone is noted. However, the argument is not persuasive because neither the '608 reference nor the Cheng reference discloses the operation conditions of the process in a liquid phase. However, the Innes reference discloses operating conditions for a transalkylation process in a liquid phase. Therefore, the examiner maintains that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the '608/Cheng process by operating the transalkylation process at the pressure as taught by Innes because the Innes pressure will maintain the process in the liquid phase.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



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A shortened statutory period for response to this final action is set to expire **THREE MONTHS** from the date of this action. In the event a first response is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tam Nguyen, whose telephone number is (703) 305-7715. The examiner can normally be reached on Monday-Thursday from 8:00 AM to 5:00 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marian Knode, can be reached on (703) 308-4311. The fax phone number for this Group is (703) 305-3599.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Tam Nguyen/ TN  
July 18, 2000  
92305019.fin

  
**Walter D. Griffin**  
**Primary Examiner**